1. A chuck assembly for use with a semiconductor wafer plasma etching device, the assembly comprising:
a chuck;

a pedestal coupled to the chuck and having a longitudinal axis; and

a drive motor coupled to the pedestal for rotating the pedestal about the longitudinal axis.

2. A chuck assembly comprising:
an internally cooled chuck;

a clamp coupled to the chuck;

a pedestal coupled to the chuck and having a central bore and a longitudinal axis, the chuck and pedestal cooperating to define a coolant chamber that communicates with the central bore; and

a drive motor coupled to the shaft for rotating the shaft about the longitudinal axis.

3. The assembly of claim 2 wherein the clamp includes an electrostatic clamp.

4. The assembly of claim 3 wherein the electrostatic clamp includes an electrostatic bias roller disposed in contact with the shaft.

5. The assembly of claim 2 further comprising a spider disposed in the coolant chamber and a push rod coupled to the spider and disposed in the central bore, the push rod including a coolant passage in communication with the coolant chamber.

6. A chuck assembly for use with a plasma etching device, the assembly comprising:

a chuck including a top surface having a plurality of slots;

a pedestal coupled to the chuck and defining therewith a coolant chamber in communication with the slots, the pedestal having a longitudinally extending passage in fluid communication with the coolant chamber, the pedestal being rotatable about a longitudinal axis;

a plurality of lift pins disposed in the coolant chamber and coupled to a longitudinally extending push rod disposed in the pedestal, the push rod including a coolant passage in communication with the coolant chamber; and

an electrostatic clamp including an electrostatic voltage source coupled to the shaft.

7. The assembly of claim 6 further including a bellows assembly coupled to the pedestal and a lift actuator coupled to the bellows assembly, the push rod moving between a wafer unloading position and a wafer clamping position and the bellows moving between a compressed position and a relaxed position in response to movement of the lift actuator.

8. The assembly of claim 7 further including a rotational coupler coupled to the push rod and a source of coolant, the rotational coupler moving with the push rod in response to actuation of the lift actuator.

9. The assembly of claim 6 further including a block coupled to a process chamber, the pedestal being coupled to the block for rotation therein, the block including a plurality of bearings for supporting the pedestal during rotation and a plurality of seals, the seals cooperating with the pedestal to seal the process chamber.

Sub B1

10. A method for plasma etching wafer comprising the steps of:
coupling a chuck to a pedestal;
coupling the wafer to the chuck;
rotating the pedestal; and
plasma etching the wafer while the pedestal is rotating.

11. The method of claim 10 further comprising the steps of internally cooling the chuck.

12. The method of claim 11, wherein the pedestal cooperates with the chuck to define a coolant chamber and includes a shaft having a coolant passage in communication with the coolant chamber, the step of internally cooling further including the step of introducing coolant to the coolant chamber through the coolant passage.

13. The method of claim 10 wherein the pedestal includes a push rod having a coolant passage, the coolant passage being in communication with a coolant source and a coolant chamber defined by the chuck and the pedestal.

14. The method of claim 10 wherein the chuck includes an electrostatic clamp.

15. The method of claim 10 further comprising the steps of initializing process parameters, the process parameters including gas flow, process chamber pressure, water temperature, and pedestal rotation speed.

16. The method of claim 10 further including the step of unloading the wafer from the chuck after plasma etching, the unloading step including the steps of providing a lift actuator coupled to a push rod and a spider and actuating the lift actuator, the push rod pushing the

spider to move the wafer away from the chuck in response to actuation of the lift actuator.

17. A plasma etching machine comprising:

a process chamber;

a rotatable, internally cooled chuck disposed in the process chamber, and

a controller coupled to the process chamber and chuck for controlling gas flow and pressure in the process chamber and rotation of the chuck.

18. The machine of claim 17 further comprising a pedestal coupled to the chuck and cooperating therewith to define a coolant chamber, the pedestal including a coolant passage in fluid communication with a coolant source and the coolant chamber.

19. The machine of claim 18 further including a lift actuator coupled to the coolant passage, the coolant passage moving in the pedestal in response to actuation of the lift mechanism to lift a wafer from the chuck.

20. The machine of claim 17 further including a pedestal coupled to the chuck, a block coupled to the process chamber, the pedestal being disposed in the block for rotation therein, and a bellows assembly coupled to the

pedestal, the block, pedestal, and bellows assembly cooperating with each other to seal the process chamber.

21. A plasma etching machine comprising:
a process chamber;

a chuck disposed in the process chamber;

a pedestal coupled to the chuck and cooperating therewith to define a coolant chamber, the pedestal including a coolant passage in communication with the coolant chamber;

a drive motor coupled to the pedestal for rotating the pedestal during plasma etching.

22. The machine of claim 21 further comprising a bellows assembly coupled to the pedestal and to a source of coolant, and a lift mechanism coupled to the bellows assembly, the lift mechanism including a lift plate coupled to a push rod disposed in the pedestal, the push rod including the coolant passage and being coupled to a plurality of lift pins, the lift pins lifting a wafer from the chuck in response to movement of the lift plate.

23. A plasma etching machine comprising:
a process chamber defining an interior region and including a bottom wall having an aperture;

a block disposed in the aperture and including a longitudinally extending bore;

a shaft extending through the bore and including a spider push rod extending longitudinally therethrough, the shaft being supported for rotation in the bore;

a chuck coupled to the shaft and disposed in the interior region, the chuck cooperating with the shaft to define a coolant chamber;

a spider disposed in the coolant chamber and coupled to the spider push rod;

a lift mechanism coupled to the spider push rod, the spider pushing up on a wafer in response to actuation of the lift mechanism; and

a drive motor coupled to the shaft for rotating the shaft during a plasma etching process.

24. The machine of claim 23 wherein the block includes a plurality of bearings for supporting the shaft for rotation in the block and a plurality of seals for sealing the process chamber.

25. The machine of claim 23 further comprising a bellows assembly coupled to the shaft and to a coolant source, the lift mechanism including a lift plate coupled to the

bellows assembly, the lift plate and bellows assembly being movable between a wafer lifting position and a disengaged position, the spider push rod including a coolant passage in communication with the chamber and being movable in response to movement of the lift plate and bellows assembly.

add B37